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**BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES**

Application Number: 10/812,718
Filing Date: March 29, 2004
Appellant(s): TAENZER, JON C.

Gerald Chan
For Appellant

EXAMINER'S ANSWER

The order from BPAI mailed on 1/22/09, ordered the examiner:

1) to clarify the status of the § 103(a) rejection of claims 21, 22, 27 and 28, 37, and 48 "as being unpatentable over Klootsema as applied to claims 17 and 23, 36 above, and further in view of Brennan et al (US 6,240,192)" [Final Rejection, page 6];¹

- a) if the above rejection was inadvertently omitted from the Examiner's Answer, vacate the Examiner's Answer mailed November 15, 2007 and generate a new Examiner's Answer setting forth the correct Grounds of rejection and correcting other sections of the Answer as may be required;
- b) if the above rejection was withdrawn, prepare a PTOL-90 which notifies appellant of such withdrawal; and

2) for such further action as may be appropriate.

In view of the order from BPAI mailed on 1/22/09, the Examiner's Answer mailed 11/15/07 has been vacated. A new Examiner's Answer is provided below to include a ground of rejection that was inadvertently omitted. Since claims 37 and 38 have been canceled in the after-final amendment received on 2/28/08, the newly added rejection is applied for claims 21, 22, 27 and 28 as being unpatentable over Klootsema as applied to claims 17 and 23, and further in view of Brennan et al. This Examiner's Answer is in response to the appeal brief filed 8/8/07 appealing from the Office action mailed 12/29/05.

(1) Real Party in Interest

A statement identifying by name the real party in interest is contained in the brief.

(2) Related Appeals and Interferences

The examiner is not aware of any related appeals, interferences, or judicial proceedings which will directly affect or be directly affected by or have a bearing on the Board's decision in the pending appeal.

(3) Status of Claims

The statement of the status of claims contained in the brief is correct.

(4) Status of Amendments After Final

The appellant's statement of the status of amendments after final rejection contained in the brief is correct.

(5) Summary of Claimed Subject Matter

The summary of claimed subject matter contained in the brief is deficient. 37 CFR 41.37(c)(1)(v) requires the summary of claimed subject matter to include: (1) a concise explanation of the subject matter defined in each of the independent claims involved in the appeal, referring to the specification by page and line number, and to the drawing, if any, by reference characters and (2) for each independent claim involved in the appeal and for each dependent claim argued separately, every means plus function and step plus function as permitted by 35 U.S.C. 112, sixth paragraph, must be identified and the

structure, material, or acts described in the specification as corresponding to each claimed function must be set forth with reference to the specification by page and line number, and to the drawing, if any, by reference characters. The brief is deficient because Figures 2, 7, 8 and 9 as identified in the summary of the claimed subjection matter do not illustrate the limitations of determining a difference between amplitudes of signals respectively produced by the first and second sensors and adjusting the amplitudes of the signals based on the determined amplitude difference as specified in claims 17 and 23. The identified Figures 15, 16, 19 and 20 and text from page 16, line 19 to page 17, line 23 do not show the limitation of summing together the adjusted signals to produce a direction signal as specified in claims 17 and 23. Additional analysis regarding the specification and the drawings would be provided below under 112, 1st paragraph rejection.

(6) Grounds of Rejection to be Reviewed on Appeal

The appellant's statement of the grounds of rejection to be reviewed on appeal is substantially correct. The changes are as follows: Claims 17, 19-21, 23 and 25-27 are rejected under 35 U.S.C. 102(b) in view of Welker. Claims 17, 18, 23 and 24 are rejected under 35 U.S.C. 103(a) in view of Klootsema. Claims 21, 22, 27 and 28 are rejected under 35 U.S.C. 103(a) as being unpatentable over Klootsema as applied to claims 17 and 23 above, and further in view of Brennan et al.

(7) Claims Appendix

The copy of the appealed claims contained in the Appendix to the brief is correct.

(8) Evidence Relied Upon

Welker, Daniel. P. et al "Microphone-Array Hearing Aids with Binaural Output - Part II: A Two-Microphone Adaptive System", IEEE Transactions on Speech and Audio Processing, Vol. 5, No. 6, November 1997, P. 543-551.

6,697,494 KLOOTSEMA et al. 2-2004

6,240,192 BRENNAN et al. 5-2001

(9) Grounds of Rejection

The following ground(s) of rejection are applicable to the appealed claims:

9.1 Claims 17-35 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

The newly amended claims 17 and 23 have limitations which are not supported by the specification and the drawings as originally filed and figure 25 subsequently filed on 9/23/05. Claim 17 specifies two amended steps of "determining a difference between amplitudes of signals respectively produced by the first and second sensors; adjusting the amplitudes of the signals based on the determined amplitude difference to produce adjusted signals". Claim 23 has similar limitation for an apparatus claim. Since

the last step of claim 17, "summing together the adjusted signals to produce a directional signal", requires an adder or a device with similar function, only the embodiments shown in Figs. 2, 7, 8, 9, 10, 11, 22 and 23 of the original figures of drawing illustrate such adder. For simplification purpose, only Figs. 8 and 9 are being used for detail explanation. Fig. 8 shows that the signals (from left and right) are adjusted by the ratio between one channel and the sum (this reads on the power ratio control), not based on the determined difference between one channel and other channel as amended in claims 17 and 23. In Fig. 9, "L/S" and "R/S" have been used for determining the adjustment for the signals from the microphones. "L/S" and "R/S" are ratios between one channel and the sum, not the determined difference between two channels as amended in claims 17 and 23. Figs. 2, 7, 10, 11, 22 and 23 have the similar layout using power ratio for determining how much adjustment is needed for the microphone signals. On p. 6 of the specification, the power ratio has been explicitly defined as the ratio between left power signal over the sum of the left and right power signals, and ratio between the right power signal over the sum of the left and right power signals. The disclosed power ratio is not equivalent to the amplitude difference between the signals as amended in claims 17 and 23.

Figs. 15, 16, 19 and 20 and text from page 16, line 19 to page 17, line 23 disclose the relationship between interaural difference and phase shift. However, none of these figures and text includes the limitation of summing together the adjusted signal to produce a direction signal. Under the heading of summary of the claimed subject matter, applicant did not even mention Figs. 22 and 23. The embodiments shown in

Figs. 22 and 23 have phase shift and they do not illustrate that the interaural difference is being used to control the phase shift. In Fig. 22, the power ratio is being applied to 2201 and 2201', the same principle is applied to the embodiment in Fig. 23. Since none of the drawings and the specification as originally filed shows how to determine the difference between the amplitudes of the signals respectively produced by the first and second sensors, adjusting the amplitudes of the signals based on the determined amplitude difference and summing together the adjusted signals to produce a directional signal, the newly amended claims 17 and 23 introduce new matter.

9.2 Claims 17, 19-21, 23 and 25-27 are rejected under 35 U.S.C. 102(b) as being anticipated by Welker et al ("Microphone-Array Hearing Aids with Binaural Output-Part II:A Two-Microphone Adaptive System") (hereafter Welker).

In view of 112, 1st paragraph rejection above, the claims have been rejected under the broadest interpretation.

Regarding claims 17, 19, 20, 23, 25 and 26, Welker discloses, Figs. 1 and 2, a method of achieving directional pickup of sound signal and a corresponding apparatus for implementing the method. Welker shows the first and second sensors (mL, mR), processing circuitry configured for determining a difference (the subtractor as shown in upper left portion of Fig. 2) between the amplitudes of signals respectively produced by the first and second sensors (see Fig. 1), for adjusting the amplitudes of the signals to produce adjusted signals based on the determined amplitude difference to produce adjusted signal ("based on" in the claim is being interpreted as subsequent after finding

the difference; the fL is adjusted after multiplier to generate x; the fR is adjusted after adder to generate y; and for summing together the adjusted signal to produce a directional signal (the claimed directional signal could read on y, sR or sL; see equation 1 at p. 545, since multiplication is essentially performing sum in one or more times in mathematical sense, y and x are summed together in equation 1; y, sR or sL is generated partly based on this equation 1).

Regarding claims 21 and 27, Welker shows the phase correction value for each band (the delay in Fig. 1 for low frequency and the delay in Fig. 2 for high frequency).

9.3 Claims 17, 18, 23 and 24 are rejected under 35 U.S.C. 103(a) as being unpatentable over Klootsema et al (hereafter Klootsema) (US 6,697,494).

In view of 112, 1st paragraph rejection above, the claims have been rejected under the broadest interpretation.

Regarding claims 17, 18, 23 and 24, Klootsema discloses an apparatus and a corresponding method for achieving directional pickup of sound comprising a first and second sensors (3a,3b) and means for summing together the signals to produce a directional signal (11); wherein the signals to be added are of approximately level matched (see last sentence of the abstract). Klootsema teaches amplitude adjusting for one microphone signal (p in 8), but fails to show means for adjusting amplitudes of signals produced by the first and second sensors to produce adjusted signals. The idea of adjusting the amplitude, as taught in Klootsema, is to match the levels of the two microphone signals. This goal could be achieved by adjusting one signal path (Klootsema teaches that) or by adjusting two signal paths. It was well known to one skilled in the art

to match two signals using either a single adjuster or two adjusters. By providing two separate adjustments for two inputs respectively, the number of shifting performed by unit 8 could be reduced, even when the two inputs have a huge level difference. However, this would require more components comparing to Klootsema's embodiment using a single adjuster. Thus, depending on the preference and the cost, it would have been obvious to one of ordinary skill in the art to modify Klootsema by providing means for adjusting the signals produced by the two sensors in order to speed up the processing using more components.

Although Klootsema fails to explicitly show how to determine the difference, the idea of adjusting the amplitude and time delay, as taught in Klootsema, is to match the levels and phase of the two microphone signals. Without finding the difference, one could not determine whether to shift up, shift down and how much adjustment is needed. Examiner takes Official Notice that this feature is notoriously well known in the art. Finding the difference between two signals and then match them based on this determined difference is one of many well known ways to match two signals. Thus, it would have been obvious to one of ordinary skill in the art to modify Klootsema by using one of the well known ways, such as finding the difference between the signals from the two microphones, in order to properly adjusting the amplitudes and phase of the microphones to match the signals from the microphones.

9.4 Claims 21, 22, 27 and 28 are rejected under 35 U.S.C. 103(a) as being unpatentable over Klootsema as applied to claims 17 and 23, 36 above, and further in view of Brennan et al (US 6,240,192) (hereafter Brennan).

In view of 112, 1st paragraph rejection above, the claims have been rejected under the broadest interpretation.

Regarding claims 21 and 27, Klootsema teaches phase correction value (z), but fails to show the phase correction value for each of multiple frequency bands. Brennan teaches that amplitude and phase corrections could be performed for multiple frequency bands individually in order to provide flexible processing. Thus, it would have been obvious to one of ordinary skill in the art to modify Klootsema in view of Brennan by separately correct the phase in multiple frequency bands in order to more accurately and efficiently generated the signal for a hearing aid.

Regarding claims 27 and 28, although Klootsema fails to show how to derive the phase correct value, the phase correction value inherently represents the difference between the signals from first and second sensors. Therefore, it would have been obvious to one of ordinary skill in the art to derive phase correction value for each frequency band by finding the difference between the signals from first and second sensors in each band.

(10) Response to Argument

On p. 4, appellant argued that it is not require to describe the subject matter of the claim literally. Examiner did not request appellant to use the exact words in the specification for the claims. Examiner raised an issue that would have been raised by one skilled in the art when interpreting the amended claims with respect to the specification and drawing as originally filed and Fig. 25 submitted subsequently on 9/23/05. Appellant did not answer examiner's question with detail explanation referring

back to a single embodiment (best if pointing out a single drawing) including all the limitations as specified in amended claims 17 and 23. Figs. 15, 16, 19 and 20 do not represent a single embodiment. Each of these identified figures fails to illustrate the limitation of summing together the adjusted signals to produce a directional signal. Page 15, lines 5-14 and 18-21 also fail to disclose this limitation. Therefore, claims 17 and 23 introduce new matter and do not satisfy 35 U.S.C. 112, 1st paragraph.

On p. 5, appellant argued that Welker fails to show adjusting amplitudes of the signals based on a determined amplitude difference. Examiner disagreed. "fR" is adjusted based on the difference at the summer to generate y. "fL" is adjusted based (this has been interpreted as subsequently) on the difference at the multiplier to generate x. Therefore, Welker discloses the claimed invention in claims 17 and 23.

On p. 6, appellant argued that Klootsema fails to disclose or suggest determining an amplitude difference. Examiner would like to point out that the office action indicated that it would have been obvious to one of ordinary skilled in the art to modify Klootsema. Klootsema, as a whole, teaches that amplitude from one microphone is adjusted by shifting (col. 2, lines 8-9), while the other signal is being left untouched. Shifting, as well known to those in the art, would require one or more steps to reach the final value. For example, if the level at the input of element 8 is binary 11, and the desired match level is 1001, then the shifting steps would be

11 (original) \rightarrow 100 \rightarrow 101 \rightarrow 110 \rightarrow 111 \rightarrow 1000 \rightarrow 1001 (final), where in " \rightarrow " represents the next step.

Without knowing there is a difference between the signal to be adjusted (from microphone 3a) and the other signal (from microphone 3b), Klootsema's system simply cannot decide whether to shift up, shift down or unchanged. Appellant's example of using the average to match the levels does not correspond to the teaching from Klootsema. Appellant's example required the adjustment for both the signals from microphones 3b and 3a. However, that is not what is being suggested in Klootsema. Klootsema's system requires only one shifter. Appellant's second example that two signals may also be matched by making one equal to other without the need to determine the amplitude difference is not fully supported by the evidence provided by appellant.

On p. 7, appellant argued that Klootsema fails to show adjust left signal based on the amplitude difference, and adjusting the right signal based on the amplitude difference. Examiner stated in the office action that it would have been obvious to one of ordinary skilled in the art to modify Klootsema to adjust both left and right signals based on the difference in order to increase the processing speed. Using the above the example again, the left signal has a binary value 11, and right signal has a binary value 1001. The required processing steps would be reduced if both signals are adjusted until they are matched.

Left: 11 (original) \rightarrow 100 \rightarrow 101 \rightarrow 110

Right: 1001 (original) → 1000 → 111 → 110

Only 3 shifting steps are required comparing to 6 steps if only one shifter is being employed. Therefore, it would have been obvious to one of ordinary skill in the art to modify Klootsema for these advantages.

(11) Related Proceeding(s) Appendix

No decision rendered by a court or the Board is identified by the examiner in the Related Appeals and Interferences section of this examiner's answer.

For the above reasons, it is believed that the rejections should be sustained.

Respectfully submitted,

/Ping Lee/
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